LUNAR NEWS

NASA/AIAA/LPI/AGU/ANS/ASCE/ SSI/NSS SYMPOSIUM

Lunar Bases and Space Activities of the 21st Century

April 5-7, 1988
Westin Galleria Hotel, Houston, Texas

A second symposium on Lunar Bases and Space Activities of the 21st Century will be sponsored by NASA, AIAA, the Lunar and Planetary Institute, the American Geophysical Union, the American Nuclear Society, the American Society of Civil Engineers, the Space Studies Institute, and the National Space Society to discuss current research on the establishment of permanent bases on the Moon and related space activities that may be pursued in the early 21st century. The broad topics to be addressed are scientific experimentation at a lunar base (such as astrophysics or human adaptation to 1/6 g), space technologies (including transportation, lunar surface infrastructure, utilization of lunar materials), and political and programmatic issues (such as public and private initiatives, international cooperation, and legal concerns).

The symposium General Chairman is Aaron Cohen, Director of the Lyndon B. Johnson Space Center.

The meeting will be held at the Westin Galleria Hotel in Houston. The meeting will consist of plenary sessions -- in which invited speakers will discuss general areas of science, technology, and policy -- and technical sessions composed of contributed papers. Contributed papers will be presented in four simultaneous technical sessions due to the large number of papers received by the program committee. Accepted submissions fall into the following categories:

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- Issues of Continuity in Space Technology Development
- Economic Horizons in Cis-lunar Space
- Issues of the Future
- Questions of Space Policy and International Linkages
- Engineering Studies from the Advanced Space Design Program (NASA OAST/USRA)

All registrants will receive a book of submitted abstracts upon arriving at the symposium. Preprints of papers will be available for purchase at a nominal fee. Symposium contributors will be encouraged to submit their papers to a peer-reviewed technical volume to be published later in the year. Relevant papers which were not presented at the meeting will also be considered for inclusion in the volume.

Special social activities will include a luncheon on April 5, a reception in the evening of April 5, and a banquet on April 6. The cost of the reception and luncheon is included in the registration fee. Tickets for the banquet must be purchased separately.

A block of hotel rooms has been reserved at special prices ($65 for a single or double room; $55 for government employees), which are available until March 14. A hotel reservation sheet is included at the back of this newsletter. All conference facilities will be within the hotel, which is attached to the Galleria Shopping Mall. The Galleria is totally enclosed, contains motion picture theaters and an ice skating rink, and is one of Houston's prime shopping attractions. Special recreational activities available at the time of the symposium include Houston Astros (vs. San Diego Padres) baseball at the Astrodome (April 5-6), Kismet at the Music Hall (April 5-6) and the Houston International Festival, an outdoors festival that begins April 7.

Arrangements are being made for group visits to the Johnson Space Center, and information about visits to other Houston attractions, including several fine museums will be available at the time of the symposium.

A copy of the symposium program will be available after February 15, 1988, from the Symposia Office, Lunar and Planetary Institute, 3303 NASA Road 1, Houston, TX 77058, (713)486-2150. Advance registration ($75.00 fee) for the meeting will be accepted at the Symposia Office until March 25, 1988. (An Advance Registration Form is included at the back of this newsletter, as well as the Preliminary Schedule for the Symposium.) All registrations received after that date will be treated as onsite registration ($85.00 fee).

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MARE BASALTS AND THE LUNAR MANTLE

Jeff Taylor
University of New Mexico

Lunar mare basalts contain detailed information about the earliest lunar differentiation, the nature of the lunar interior, and the thermal history of the Moon. Lunar science is experiencing a renaissance in the study of mare basalts, sparked by the discovery of ancient (older than 4.0 billion years) and new types of basalts, the recognition of numerous groups of pyroclastic glasses, and the vastly improved understanding of petrologic processes for basalt genesis, such as assimilation accompanied by fractional crystallization. Similarly, studies into the nature of the lunar mantle have received renewed interest, particularly with respect to the collisional origin for the Moon.

A special session, sponsored by the Planetary (P) section will be held at the Spring 1988 meeting of the American Geophysical Union (AGU). The session, like most lunar research, will be interdisciplinary. There will be about six invited speakers, but contributions are welcomed from specialists in petrology and geochemistry, experimental petrology, remote sensing and photography, and geophysics. All contributors should prepare and send two copies of a standard AGU

abstract to either of the session organizers, as well as the original to AGU, before the deadline of February 24, 1988. Session organizers are: Lawrence A. Taylor, Department of Geological Sciences, University of Tennessee, Knoxville, TN 37996 [telephone: (615) 974-6013]; and G. Jeffrey Taylor, Institute of Meteoritics, University of New Mexico, Albuquerque, NM 87131 [telephone: (505) 277-9159].

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NASA FUNDS RESEARCH ON CONCRETE LUNAR BASES

T. D. Lin

In March 1986 the National Aeronautics and Space Administration (NASA) awarded Construction Technology Laboratories, Inc. (CTL) 40 grams of lunar soil collected during the Apollo 16 mission for determining physical properties of lunar concrete. The result shows that concrete made with lunar soil as aggregate is an excellent building material.

In July 1987 NASA funded CTL to further investigate lunar base construction using concrete material. The Citadel College of South Carolina supported the project by sending two top civil engineering students to CTL to take part in the structural analysis and design. Lockheed Corporation provided the needed assistance and guidance.

The designed lunar base is a three-story cylindrical building made with precast, prestressed concrete members. The proposed structure measures 120 ft. in diameter and 72 ft. high, and provides 33,000 sq. ft. of work area. A large concrete structure on the surface of the Moon could support scientific studies, industrial operations, logistics, and mission control systems.

Two major problems were encountered in the design: the 1-atmosphere internal pressure for the infrastructure and the dry, compressible lunar soil for the foundation. Innovative concepts for tension columns and floating foundation were developed for the designs of the infrastructure and foundation, respectively. Results of the investigation will be submitted to NASA and will be presented at the second symposium on "Lunar Bases and Space Activities of the 21st Century" in April 1988.

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DISSECTION BEGUN ON LUNAR CORE 15009

Carol Schwarz

Single drive tube 15009 was opened recently, and preliminary information on its contents is now available with the first dissection pass completed.

15009 was collected in July 1971 at Station 6 inside the north rim of a 12 m crater located about 500 m east of Spur Crater on the Apennine Front. 15009 remained untouched in the core tube with an apparent length of 34.9 cm until it was extruded on November 24, 1987. After extrusion the core weighed 621 g and its length was 29.3 cm.

The core tube was easily pushed into the regolith of the subdued crater rim and was completely filled with soil. The surface was reported to be generally fine-grained but littered with larger angular fragments 0.5 to 2 cm in diameter. Although white soil was observed below the surface in the area where the core was taken, no distinctly colored layers were observed in the core. Based on the composition of the >1 mm particles, however, there appears to be some layering.

"Lunar News" is produced three times a year by the Planetary Materials Branch of the Solar System Exploration Division, Johnson Space Center of the National Aeronautics and Space Administration. "Lunar News" is intended to be a forum for discussion of facts and opinions regarding lunar sample study, Lunar Geochemical Orbiter and Lunar Base activities. It is sent free to a mailing list of more than 700 individuals; to be included on the mailing list, write to the address below. Your contributions to "Lunar News" on topics relating to the study, exploration and utilization of the Moon and comments about "Lunar News" and material appearing in it should be sent to:

Doug Blanchard, Lunar Sample Curator
Code SN2, NASA JSC
Houston, TX 77058

The color of 15009 is 10 YR 4/1 to 5/1 on the Munsell color scale. A void extended from the top to about 9 cm down the length of the core even though compaction occurred during extrusion. The upper 9 to 10 cm of the core is loosely packed and soil clods are abundant. From 9.5 to about 13.5 cm the >1 mm fragments are mostly coherent with a few agglutinates. Glass-splashed breccias are relatively more abundant, and no clods are present. At 13.5 cm the friable soil clods appear again until about 16.5 cm. From 16.5 to 18.5 cm coherent breccias are relatively more abundant, along with some anorthositic fragments, possible basalt fragments, and soil breccias with glass. From about 18.5 cm to the end of the core, the soil clods are again abundant, getting larger (some up to 8 mm in diameter compared with 1 to 2 mm in most intervals) at about 22 cm and smaller again at 23.5 cm. Only a few glass spheres were observed in the >1 mm fraction; they were generally small, black, and incomplete. One very small (<0.5 mm) green glass sphere was observed attached to a soil clod in the >1 mm fraction of the 27.0 to 27.5 cm dissection interval.

A close examination of the number of particles greater than 1 mm showed that 88% are in the 1 to 2 mm size range, 10% are 2 to 4 mm in diameter, about 2% are 4 to 10 mm, and less than 1% are greater than 10 mm. Composition-wise, 75% of the >1 mm particles are breccias, including friable soil clods, coherent light and medium gray matrix breccias, and very coherent, possibly glassy matrix breccias; 15% are glass fragments (including some agglutinates) or soil breccias with significant glass splashes; 5% are basalts; and 5% are white or light gray plagioclase-rich fragments. More information will be available as the second and third passes are completed.

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19th LUNAR & PLANETARY SCIENCE CONFERENCE ANNOUNCEMENT

The 19th Lunar & Planetary Science Conference will be held at the Johnson Space Center, Houston, Texas, March 14-18, 1988. Increased interest in the conference was evidenced by the submission of over 700 abstracts. Oral presentations will be given in 27 half-day sessions, with three sessions running concurrently.

The conference sponsors include: NASA Johnson Space Center, Lunar & Planetary Institute, American Association of Petroleum Geologists, American Geophysical Union, Division for Planetary Sciences of the American Astronomical Society, Geological Society of America, International Union of Geological Sciences, and Meteoritical Society. Dr. Michael Duke, JSC, and Dr. Kevin Burke, LPI, are conference chairmen. The conference registration fee is $40, except students with student ID's who may register for $20. The deadline to pre-register is March 7. Pre-registration forms and additional information may be obtained from the Lunar & Planetary Institute Projects Office at (713) 486-2166, 3303 NASA Road 1, Houston, Texas 77058-4399.

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LUNAR SAMPLE ACTIVITY

The Lunar and Planetary Sample Team (LAPST) reviewed 19 requests for lunar samples at its November 19-20 meeting. LAPST recommended allocating 39 samples (weighing 6.8 grams) and 289 thin sections to 12 investigators for scientific study and one sample weighing approximately 166 grams as a long-term educational display. After careful review LAPST recommended denial of the requests from two individuals. Neither request provided adequate scientific justification.

LAPST reviewed ten requests for lunar samples from nine individuals at the February 8-10 meeting. The team recommended allocating 33 samples (weighing 13.83 g) and 144 thin sections to seven investigators for scientific study and one sample weighing about 160 grams as a long term educational display. The tenth request, received near noon of the second meeting day, was tabled. The requestor will be asked to provide additional information prior to the June meeting.

At its June meeting, LAPST will review requests received by May 27, 1988.

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